BROOKHAVEN NATIONAL LABORATORY

Work Permit #
Work Order # _____
Job# _____ Activity# _____

1. Work requester fills out this section. ☐ **Standing Work Permit**

Requester: Don Lynch	Date: 7/5/2006	Ext.: 2253	Dept/Div/Group: PO/PHENIX
Other Contact person (if different from requester): Sal Marino			Ext.: 3704
Work Control Coordinator: Don Lynch		Start Date: 7/31/2006	Est. End Date: 10/30/2006
Brief Description of Work: Install RXNP Detector in IR			
Building: 1008	Room: IR	Equipment: n/a	Service Provider: PHENIX Techs

. WCC, Requester/Designee, Service Provider, and ES&H (as necessary) fill out this section or attach analysis

ES&H ANALYSIS				
Radiation Concerns	☐ None	☐ Activation	☐ Airborne	☐ Contamination	☐ Radiation
Radiation Generating Devices:	☐ Radiography	☐ Moisture Density Gauges	☐ Soil Density Gauges	☐ X-ray Equipment
☐ Special nuclear materials involved, notify Isotope Special Materials Group			☐ Fissionable materials involved, notify Laboratory Criticality Officer	
Safety Concerns	☐ None	☐ Ergonomics	☐ Transport of Haz/Rad Material	
☐ Adding/Removing Walls or Roofs	☐ Confined Space*	☐ Explosives	☒ Lead*	☐ Penetrating Fire Walls
	☐ Corrosive	☐ Flammable	☐ Magnetic Field*	☐ Pressurized Systems
☐ Asbestos*	☐ Cryogenic	☐ Fumes/Mist/Dust*	☐ Material Handling	☐ Rigging/Critical Lift
☐ Beryllium*	☐ Electrical	☐ Heat/Cold Stress	☐ Noise*	☐ Toxic Materials*
☐ Biohazard*	☐ Elevated Work*	☐ Hydraulic	☐ Non-ionizing Radiation*	☐ Vacuum
☐ Chemicals*	☐ Excavation	☐ Lasers*	☐ Oxygen Deficiency*	☐ Other UV Lamp
* Does this work require medical clearance or surveillance from the Occupational Medicine Clinic? ☐ Yes ☒ No				
Environmental Concerns		☒ None	☐ Work impacts Environmental Permit No.	
☐ Atmospheric Discharges (rad/non-rad)		☐ Land Use	☐ Soil Activation/contamination	☐ Waste-Mixed
☐ Chemical or Rad Material Storage or Use		☐ Liquid Discharges	☐ Waste-Clean	☐ Waste-Radioactive
☐ Cesspools (UIC)		☐ Oil/PCB Management	☐ Waste-Hazardous	☐ Waste-Regulated Medical
☐ High water/power consumption		☐ Spill potential	☐ Waste-Industrial	☐ Underground Duct/Piping
Waste disposition by:				☐ Other
Pollution Prevention (P2)/Waste Minimization Opportunity:		☒ None ☐ Yes		
FACILITY CONCERNS	☒ None			
☐ Access/Egress Limitations	☐ Electrical Noise	☐ Potential to Cause a False Alarm		☐ Vibrations
	☐ Impacts Facility Use Agreement		☐ Temperature Change	☐ Other
☐ Configuration Control	☐ Maintenance Work on Ventilation Systems		☐ Utility Interruptions	
WORK CONTROLS				
Work Practices				
☐ None	☐ Exhaust Ventilation	☐ Lockout/Tagout	☐ Spill Containment	☐ Security (see Instruction Sheet)
☐ Back-up Person/Watch	☐ HP Coverage	☐ Posting/Warning Signs	☐ Time Limitation	☒ Other: Magnet Operational Lockout and survey
☐ Barricades	☐ IH Survey	☐ Scaffolding-requires inspection	☐ Warning Alarm (i.e. "high level")	
Protective Equipment				
☐ None	☐ Ear Plugs	☐ Gloves	☐ Lab Coat	☐ Safety Glasses
☐ Coveralls	☐ Ear Muffs	☐ Goggles	☐ Respirator	☐ Safety Harness
☐ Disposable Clothing	☐ Face Shield	☐ Hard Hat	☐ Shoe Covers	☒ Safety Shoes ☐ Other
Permits Required (Permits must be valid when job is scheduled.)				
☒ None	☐ Cutting/Welding	☐ Impair Fire Protection Systems		
☐ Concrete/Masonry Penetration	☐ Digging/Core Drilling	☐ Rad Work Permit-RWP No		
☐ Confined Space Entry	☐ Electrical Working Hot	☐ Other		
Dosimetry/Monitoring				
☒ None	☐ Heat Stress Monitor	☐ Real Time Monitor	☐ TLD	
☐ Air Effluent	☐ Noise Survey/Dosimeter	☐ Self-reading Pencil Dosimeter	☐ Waste Characterization	
☐ Ground Water	☐ O_2/Combustible Gas	☐ Self-reading Digital Dosimeter	☐ Other	
☐ Liquid Effluent	☐ Passive Vapor Monitor	☐ Sorbent Tube/Filter Pump		
Training Requirements (List below specific training requirements)				
PHENIX Awareness, CA Access				
Based on analysis above, the Walkdown Team determines the risk, complexity, and coordination ratings below:			**If using the permit when all hazard ratings are low, only the following need to sign: (Although allowed, there is no need to use back of form)**	
ES&H Risk Level:	☒ Low	☐ Moderate ☐ High	WCC:	Date:
Complexity Level:	☐ Low	☒ Moderate ☐ High	Service Provider:	Date:
Work Coordination:	☒ Low	☐ Moderate ☐ High	Authorization to start	Date:
			(Departmental Sup/WCC/Designee)	

3. Both work requester and service provider contribute to work plan (use attachments for detailed plans)

Work Plan (procedures, timing, equipment, and personnel availability need to be addressed): See attached Installation Procedure
Special Working Conditions Required:
Operational Limits Imposed:
Post Work Testing Required:
Job Safety Analysis Required: ☐ Yes ☒ No — Walkdown Required: ☐ Yes ☒ No

Reviewed by: Primary Reviewer will determine the size of the review team and the other signatures required based on hazards and job complexity. Primary Reviewer signature means that the hazards and risks that could impact ES&H have been identified and will be controlled according to BNL requirements.

Title	Name (print)	Signature	Life #	Date
Primary Reviewer				
ES&H Professional				
Other				
Other				
Work Control Coordinator	Don Lynch		20146	
Service Provider				
	Review Done: ☐ in series	☐ team		

4. Job site personnel fill out this section.

Note: Signature indicates personnel performing work have read and understand the hazards and permit requirements (including any attachments).			
Job Supervisor:		Contractor Supervisor:	
Workers:	Life#:	Workers :	Life#:
Workers are encouraged to provide feedback on ES&H concerns or on ideas for improved job work flow. Use feedback form or space below.			

5. Departmental Job Supervisor, Work Control Coordinator/Designee

Conditions are appropriate to start work: (Permit has been reviewed, work controls are in place and site is ready for job.)			
Name:	Signature:	Life#:	Date:

6. Departmental Job Supervisor, Work Requester/Designee determines if Post Job Review is required. ☐ Yes ☐ No

Post Job Review (Fill in names of reviewers)			
Name:	Signature:	Life#:	Date:
Name:	Signature:	Life#:	Date:

7. Worker provides feedback.

Worker Feedback (use attached sheets as necessary)
a) WCM/WCC: Is any feedback required? ☐ Yes ☐ No

b) Workers: Are there better methods or safer ways to perform this job in the future? ☐ Yes ☐ No

8. Closeout: Work Control Coordinator (authorizing dept.) checks quality of completed permit and ensures the work site is left in an acceptable condition. (WCC can delegate clean up of work area to work supervisor)

Name:	Signature:	Life#:	Date:
Comments:			

RXNP Installation Procedure (To Install in CM region of PHENIX IR)

(Note: the following sequence assumes that the North and South detector installations will be performed sequentially allowing for separate delivery of the North and South detector modules. Should the North and South detectors arrive together, the instructions below may be performed concurrently.)

Please refer to attached figures for reference. All lifting and positioning of detector components is to be accomplished manually by a minimum of 2 PHENIX mechanical technicians working in coordination.

Extreme care shall be taken at all times to avoid any contact by equipment and/or personnel with the beampipe.

I. North Detector section

a. Verify that PHENIX magnets are locked out of operation
b. Install soft beampipe protection
c. Install 2 baseplates on North nosecone.
d. Test fitup 4quadrants on North baseplate and mark arm mounting hole location for drilling and tapping
e. Drill and tap 4 mounting holes on North poleface (Note: drilling and tapping for south detector may be done at same time.)
f. Pre-install cable management trays on CM pole, flux return and ibeams as shown
g. Pre assemble PMT's, arms, trays, fibers, spacers, covers and scintillators as shown into quadrants.
h. Install 4 quadrants as shown on base plates and secure arms to pole face
i. Mount LED box on U-shaped cable tray leg and route fibers to PMT's
j. Route cables from bridge rack location to PMT's as shown

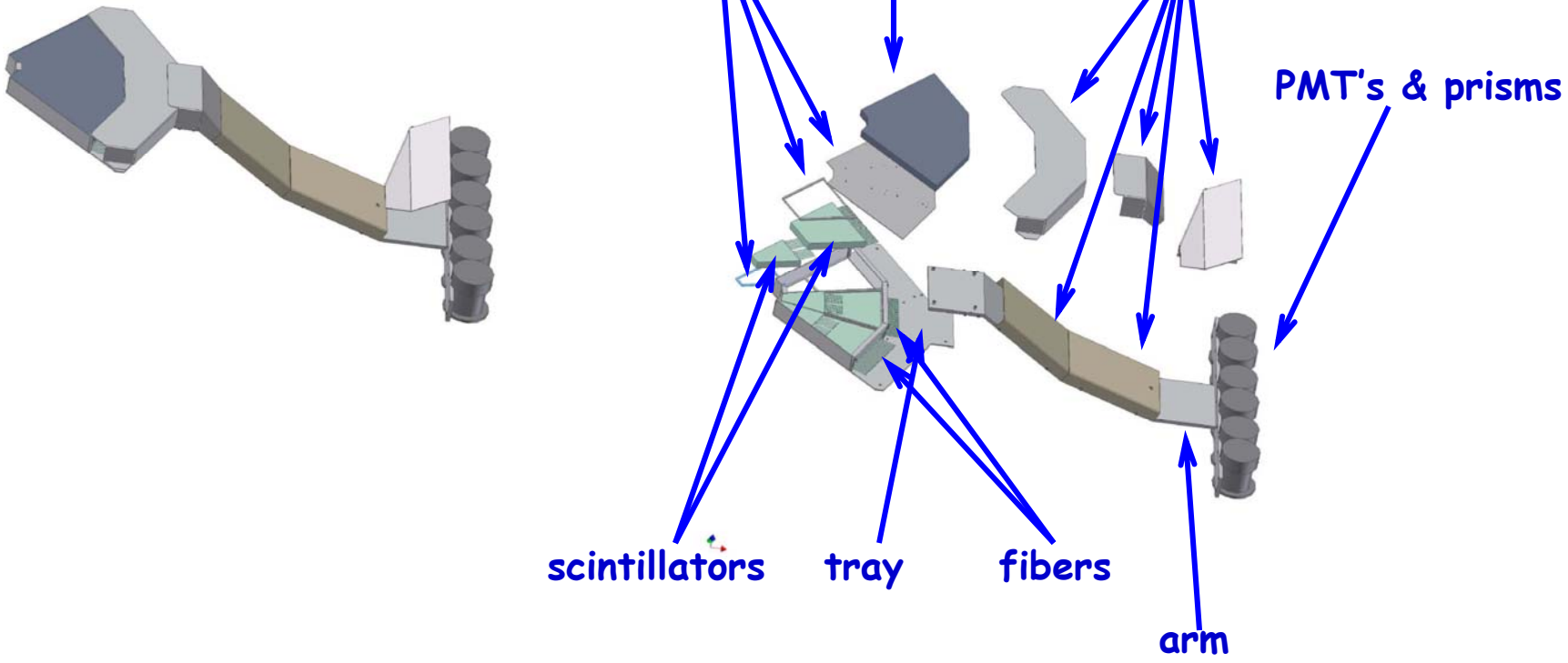
II. South Detector section

a. Repeat steps c through j for the south detector

See the attached diagrams for further information.

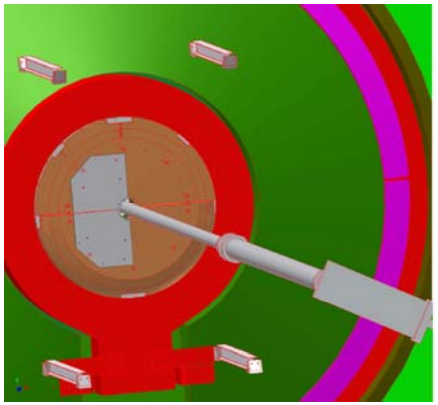
Detectors are now ready for electrical connection to rack electronics and commissioning.

RXNP Quadrant Assembly



RXNP Installation

1



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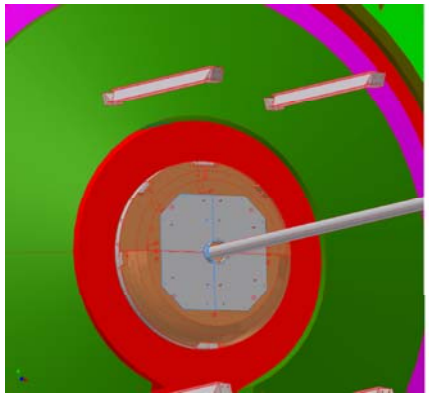
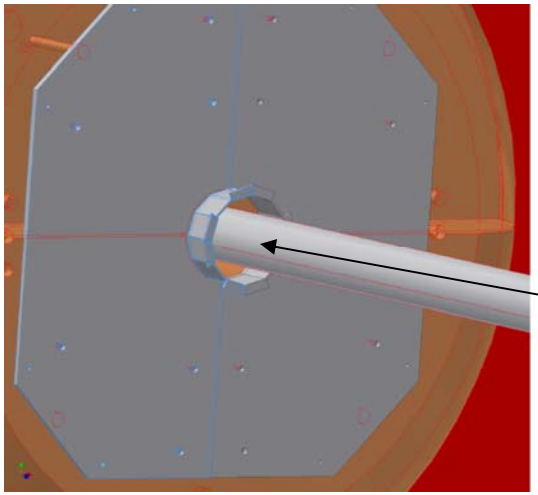


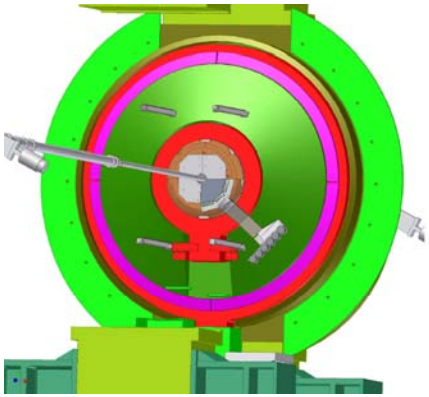


Steps 1 and 2: Baseplates are fastened to brass nosecone

Inner shield of baseplates forms protective barrier around beampipe for quadrant installation. Beampipe to be covered with protective foam cushioning sleeve during installation (not shown).

RXNP Installation

3



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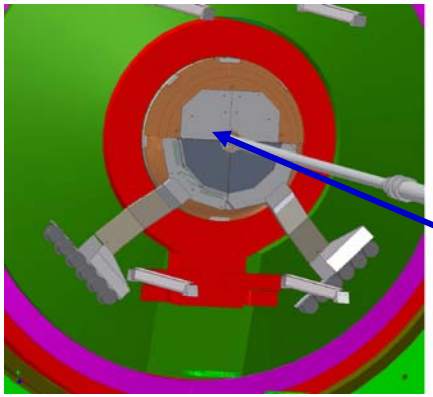
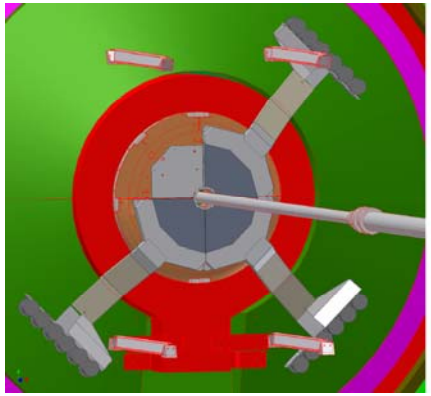


Lower quadrants installed first. Upper surface of lower quadrants forms a shelf to help support upper quadrant installation outboard of beampipe then slid along "shelf" inboard to final location



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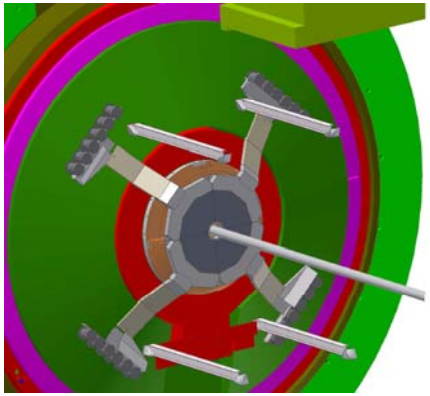

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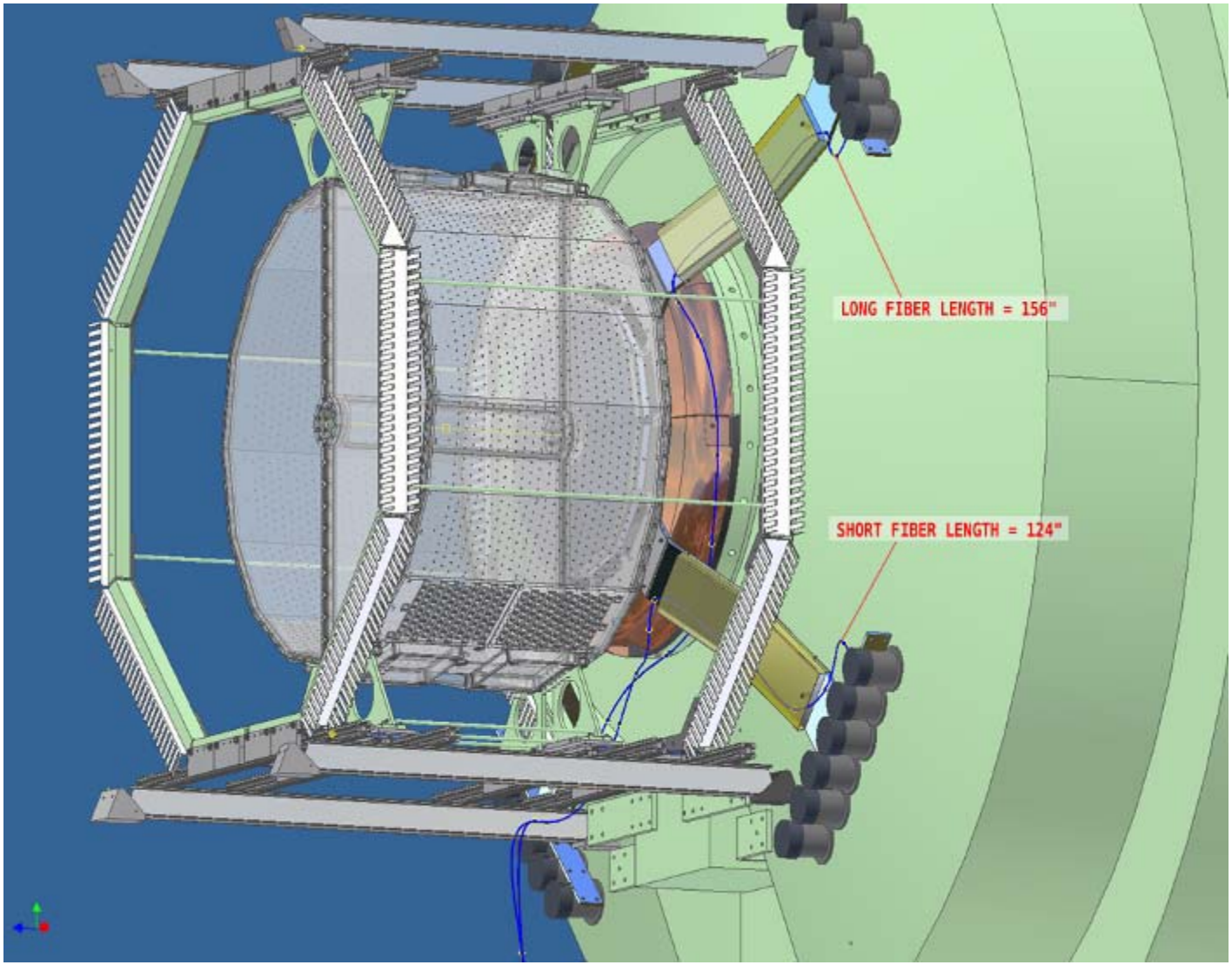
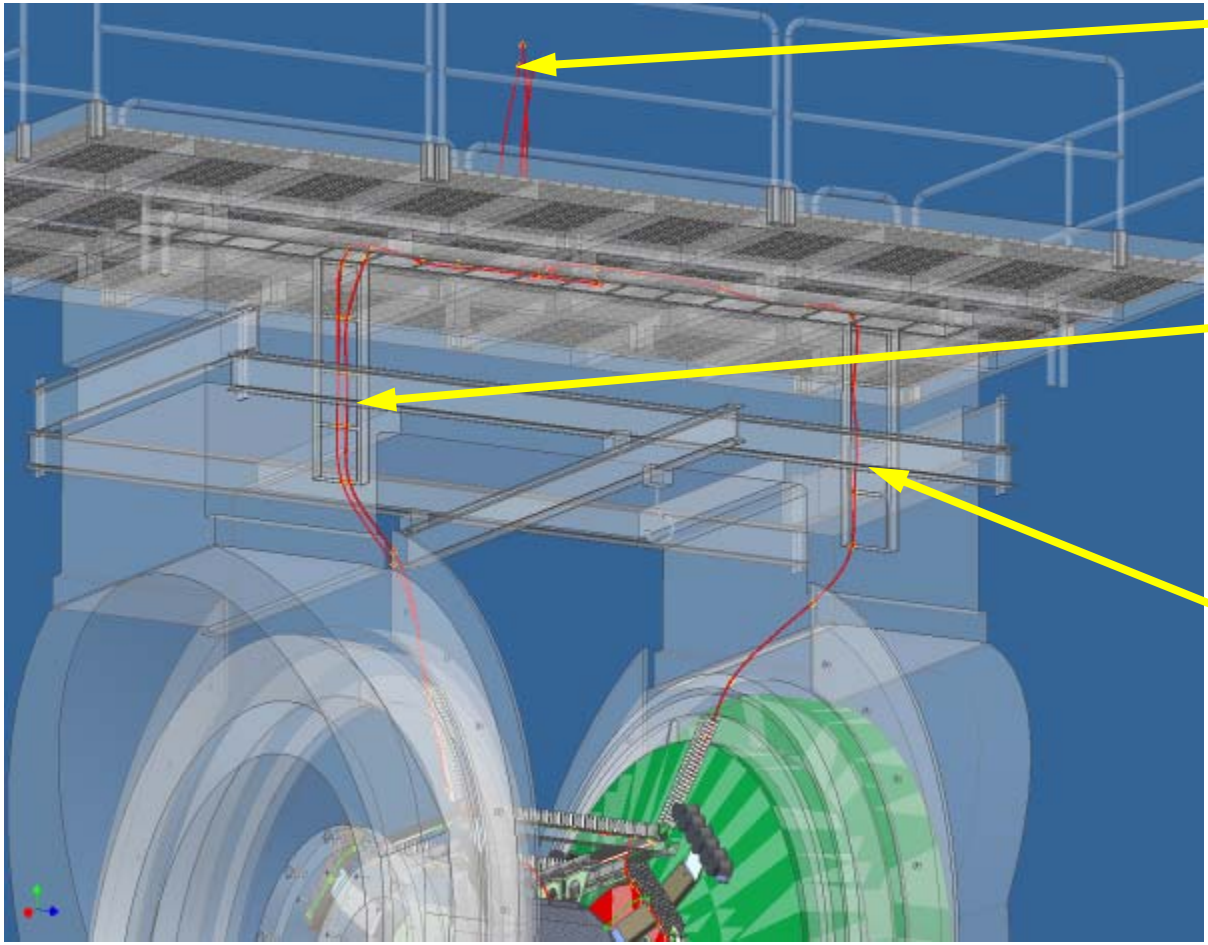
LED Fiber Routing

RXNP



RXNP & HBD Cable Routing 1

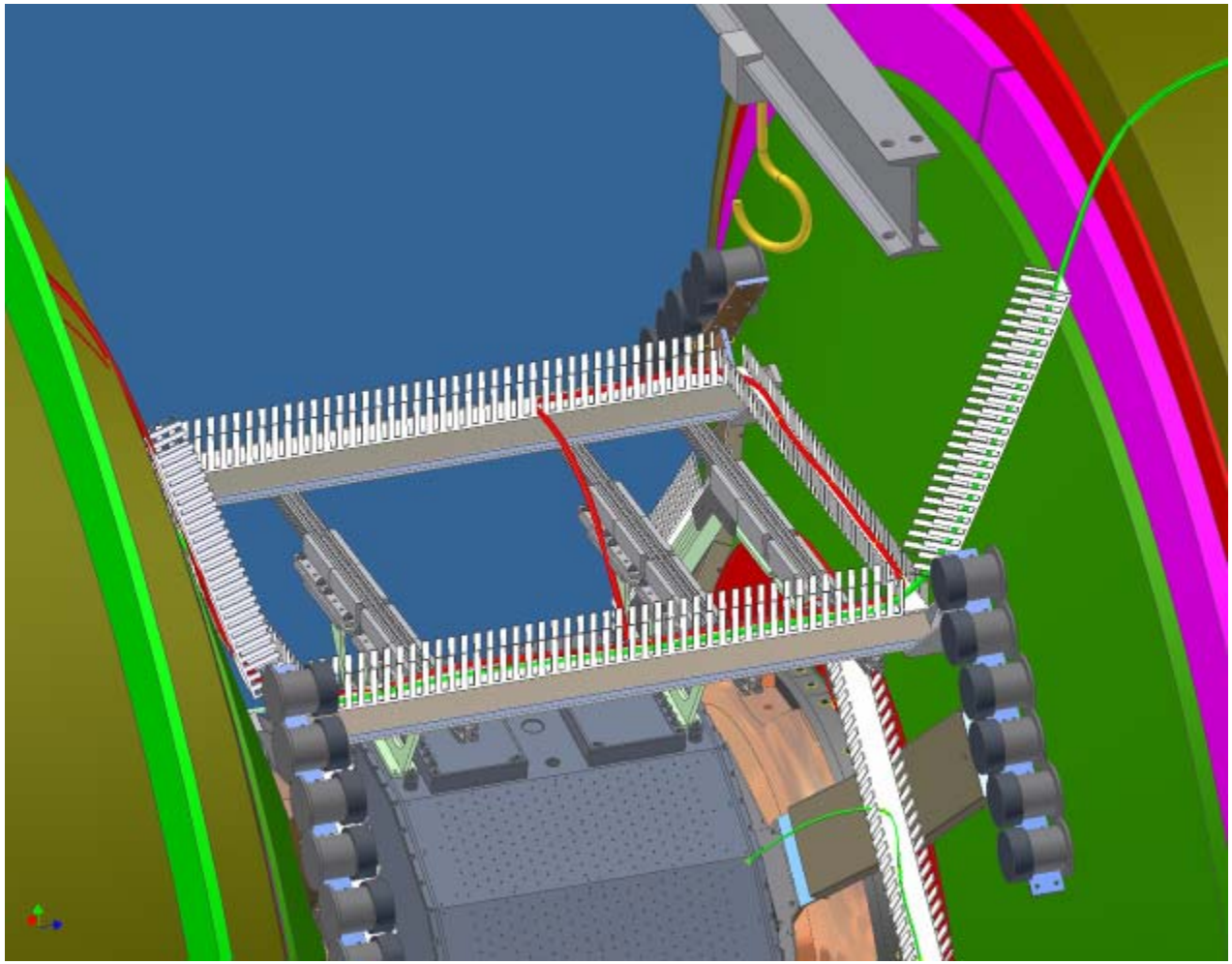


HBD HV & RXNP racks on Bridge near center

HBD HV Cables routed on southeast face of CM flux return

RXNP cables routed on northeast face of CM flux return

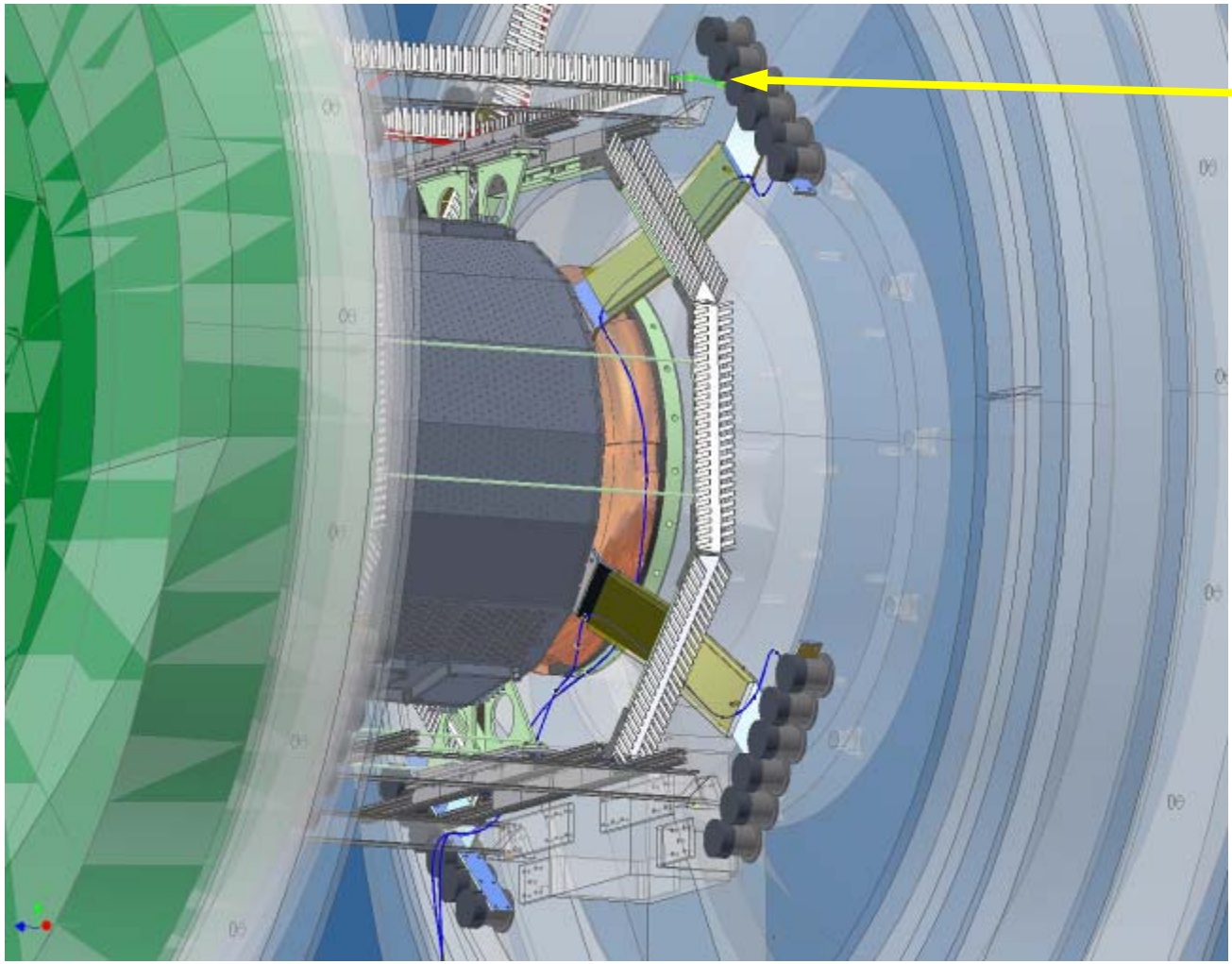
RXNP & HBD Cable Routing 2



RXNP cables come down from top of CM north pole face to east upper i-beam, ¾ cross over to west upper i-beam and ½ cross to south pole face

HBD HV cables follow opposite route (from top of CM south pole face to west upper i-beam, ¾ cross over to east upper i-beam and ½ cross to north pole face)

RXNP & HBD Cable Routing 3



RXNP Cables from i-beam take short route to PMT's